

WHAT IS CLAIMED IS

1. A peptide composition of less than 250 amino acid residues comprising a peptide epitope useful for inducing an immune response against hepatitis C virus (HCV) said epitope (a) having an amino acid sequence of about 8 to about 13 amino acid residues that have at least 65% identity with a native amino acid sequence of HBV and, (b) binding to at least one HLA class I HLA allele with an IC_{50} of less than about 500 nM.
2. The composition of claim 1, further wherein said peptide has at least 77% identity with a native HCV amino acid sequence.
3. The composition of claim 1, further wherein said peptide has 100% identity with a native HCV amino acid sequence.
4. A pharmaceutical composition comprising a peptide and a pharmaceutical carrier, wherein the peptide is a peptide of Table VII (A1 supermotif), Table VIII (A2 supermotif/A*0201 motif), Table IX (A3 supermotif), Table X (A24 supermotif), Table XI (B7 supermotif), Table XII (B27 supermotif), Table XIII (B58 supermotif), Table XIV (B62 supermotif), Table XV (A1 motif), Table XVI (A3 motif), Table XVII (A11 motif), or Table XVIII (A24 motif) comprising an IC_{50} of less than about 500 nM for at least one HLA class I molecule.
5. The pharmaceutical composition of claim 4 wherein the composition comprises the peptide in a form of nucleic acids that encode the peptide.
6. The pharmaceutical composition of claim 5 wherein the composition comprises the peptide in a form of nucleic acids that encode the epitope and one or more additional peptide(s).
7. The composition of claim 4, wherein the peptide is comprised by a longer peptide, with a *proviso* that the longer peptide is not an entire native antigen.
8. The pharmaceutical composition of claim 4 wherein the peptide is in a human dose form, and the carrier is in a human unit dose.

9. A peptide composition of claim 1 comprising an analog of a peptide epitope, wherein the peptide epitope is an epitope of Table VII (A1 supermotif), Table VIII (A2 supermotif/A2.1 motif), Table IX (A3 supermotif), Table X (A24 supermotif), Table XI (B7 supermotif), Table XII (B27 supermotif), Table XIII (B58 supermotif), Table XIV (B62 supermotif), Table XV (A1 motif), Table XVI (A3 motif), Table XVII (A11 motif), or Table XVIII (A24 motif), said analog comprising a preferred or less preferred amino acid of Table II substituted in for a starting residue, or having a deleterious residue of Table II substituted out of the starting sequence and replaced by a non-deleterious residue.

10. A peptide composition of claim 1 comprising a peptide of Table XXII.

11. A method for inducing a cytotoxic T lymphocyte response, said method comprising steps of:

providing a peptide that comprises an IC_{50} of less than about 500 nM for an HLA class I molecule, wherein the peptide is a peptide of Table VII (A1 supermotif), Table VIII (A2 supermotif/A2.1 motif), Table IX (A3 supermotif), Table X (A24 supermotif), Table XI (B7 supermotif), Table XII (B27 supermotif), Table XIII (B58 supermotif), Table XIV (B62 supermotif), Table XV (A1 motif), Table XVI (A3 motif), Table XVII (A11 motif), or Table XVIII (A24 motif); and,

administering said peptide to a human.

12. The method of claim 11, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide.

13. The method of claim 12, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide and at least one additional peptide, with a *proviso* that an additional peptide is not an entire native antigen.

14. The method of claim 11, wherein the providing step provides the peptide comprised by a longer peptide, with a *proviso* that the longer peptide is not an entire native antigen.

15. A method for inducing a cytotoxic T lymphocyte response, said method comprising steps of:

providing a peptide that induces a cytotoxic T cell response *in vitro* and/or *in vivo*, wherein the peptide is a peptide of Table VII (A1 supermotif), Table VIII (A2 supermotif/A2.1 motif), Table IX (A3 supermotif), Table X (A24 supermotif), Table XI (B7 supermotif), Table XII (B27 supermotif), Table XIII (B58 supermotif), Table XIV (B62 supermotif), Table XV (A1 motif), Table XVI (A3 motif), Table XVII (A11 motif), Table XVIII (A24 motif) or Table XXIII; and,

administering said pharmaceutical composition to a human.

16. The method of claim 15, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide.

17. The method of claim 16, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide and at least one additional peptide, with a *proviso* that an additional peptide is not an entire native antigen.

18. The method of claim 15, wherein the providing step provides the peptide comprised by a longer peptide, with a *proviso* that the longer peptide is not an entire native antigen.

19. The method of claim 15, wherein the providing step comprises a peptide that induces a cytotoxic T cell response when complexed with an HLA class I molecule and is presented to an HLA class I-restricted cytotoxic T cell.

20. A peptide composition of less than 250 amino acid residues comprising a peptide epitope useful for inducing an immune response against hepatitis B virus (HCV) said epitope (a) having an amino acid sequence of about 6 to about 25 amino acid residues that have at least 65% identity with a native amino acid sequence of HCV and, (b) binding to at least one HLA class II HLA allele with an IC_{50} of less than about 1000 nM.

21. The composition of claim 20, further wherein said peptide has at least 77% identity with a native HCV amino acid sequence.

22. The composition of claim 20, further wherein said peptide has 100% identity with a native HCV amino acid sequence.

23. A pharmaceutical composition comprising:
a human dose form of a peptide of Table XIX or Table XX that comprises an IC_{50} of less than about 1,000 nM for at least one HLA DR molecule of an HLA DR supertype; and,
a human dose of a pharmaceutically acceptable carrier.

24. The pharmaceutical composition of claim 23 wherein the composition comprises the peptide in a form of nucleic acids that encode the peptide.

25. The pharmaceutical composition of claim 24 wherein the composition comprises the peptide in a form of nucleic acids that encode the peptide and at least one additional peptide, with a *proviso* that an additional peptide is not an entire native antigen.

26. The composition of claim 25, wherein the peptide is comprised by a longer peptide, with a *proviso* that the longer peptide is not an entire native antigen.

27. A peptide composition of claim 20 comprising an analog of a peptide epitope of Table XIX or Table XX, said analog comprising a preferred or less preferred amino acid of Table III substituted in for a starting residue, and/or having a deleterious residue of Table III substituted out of the starting sequence and replaced by a non-deleterious residue.

28. A method for inducing a helper T lymphocyte response, said method comprising steps of:

providing a peptide that comprises an IC_{50} of less than about 1,000 nM for an HLA class II molecule, wherein the peptide is a peptide of Table XIX or Table XX; and,

administering said peptide to a human.

29. The method of claim 28, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide.

30. The method of claim 29, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide and at least one additional peptide, with a *proviso* that an additional peptide is not an entire native antigen.

31. The method of claim 28, wherein the providing step provides the peptide comprised by a longer peptide, with a *proviso* that the longer peptide is not an entire native antigen.

32. A method for inducing a helper T lymphocyte response, said method comprising steps of:

providing a peptide that induces a helper T cell response *in vitro* and/or *in vivo*, wherein the peptide is a peptide of Table XIX or Table XX; and,

administering said pharmaceutical composition to a human.

33. The method of claim 32, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide.

34. The method of claim 33, wherein the providing step provides the peptide in a form of nucleic acids that encode the peptide and at least one additional peptide, with a *proviso* that an additional peptide is not an entire native antigen.

35. The method of claim 32, wherein the providing step provides the peptide comprised by a longer peptide, with a *proviso* that the longer peptide is not an entire native antigen.

36. The method of claim 32, wherein the providing step comprises a peptide that induces a helper T cell response when complexed with an HLA class II molecule and is presented to an HLA class I-restricted helper T cell.

37. A vaccine for preventing or treating HCV infection that induces a protective or therapeutic immune response, wherein said vaccine comprises:

at least one peptide selected from Table(s) VII-XX or Table XXII; and,
a pharmaceutically acceptable carrier.

38. A kit for a vaccine that induces a protective or therapeutic immune response to HCV, said vaccine comprising:

at least one peptide selected from Table(s) VII-XX or Table XXII;
a pharmaceutically acceptable carrier; and,
instructions for administration to a patient.

39. A method for monitoring or evaluating an immune response to HCV or an epitope thereof in a patient having a known HLA type, the method comprising:

incubating a T lymphocyte sample from the patient with a peptide selected from Table(s) VII-XX or Table XXII, wherein that peptide bears a motif corresponding to at least one HLA allele present in said patient; and,

detecting the presence of a T lymphocyte that recognizes the peptide.

40. The method of claim 39, wherein the peptide is comprised by a tetrameric complex.

41. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and combination of motif-bearing peptides that are immunologically cross-reactive with hepatitis C virus-1 (HCV-1), wherein at least one of the peptides bears a motif of Table Ia, and further wherein the combination of motif-bearing peptides consists of:

a) one or more peptides comprising at least 8 amino acids from an HCV C domain, the HCV C domain consisting of amino acids 1-120 of the HCV polyprotein;

b) one more peptides comprising at least 8 amino acids of a further domain, wherein the further domain is selected from the group consisting of:

an S domain, the S domain consisting of amino acids 120-400 of the HCV polyprotein;

an NS3 domain, the NS3 domain consisting of amino acids 1050 to 1640 of the HCV polyprotein;

an NS4 domain, the NS4 domain consisting of amino acids 1640 to 2000 of the HCV polyprotein; and,

an NS5 domain, the NS5 domain consisting of amino acids 2000 to 3011 of the HCV polyprotein; and,

42. The composition of claim 41, wherein the composition further comprises one or more additional HCV motif-bearing peptide(s) that are one or more distinct HCV peptides comprising at least 8 amino acids of an X domain, the X domain consisting of amino acids 750 to 1050 of the HCV polyprotein.

43. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and combination of motif-bearing peptides that are immunologically cross-reactive with peptides of hepatitis C virus-1 (HCV-1), the peptides from multiple domains of HCV, wherein at least one of the peptides bears a motif of Table Ia, and further wherein the combination of peptides consists essentially of:

a) one or more peptides comprising at least 8 amino acids from a C domain, the C domain consisting of amino acids 1 to 120 of an HCV polyprotein; and,

b) one or more peptides comprising at least 8 amino acids from an S domain, the S domain consisting of amino acids 120-400 of the HCV polyprotein; or,

one or more peptides comprising at least 8 amino acids from an NS3 domain, the NS3 domain consisting of amino acids 1050 to 1640 of the HCV polyprotein; or,

one or more peptides comprising at least 8 amino acids from an NS4 domain, the NS4 domain consisting of amino acids 1640 to 2000 of the HCV polyprotein; or,

one or more peptides comprising at least 8 amino acids from an NS5 domain, the NS5 domain consisting of amino acids 2000 to 3011 of the HCV polyprotein; and,

c) one HCV peptide comprising at least 8 amino acids of an envelope domain, the envelope domain consisting of amino acids 192 to 750 of the HCV polyprotein.

44. The composition of claim 43, wherein the composition further comprises one or more HCV peptides comprising at least 8 amino acids of an X domain, the X domain consisting of amino acids 750 to 1050 of the HCV polyprotein.

45. A pharmaceutical composition comprising:

a) a pharmaceutically acceptable carrier; and,

b) a combination of one or more motif-bearing peptides of at least 8 amino acids derived from one or more hepatitis C virus (HCV) domains, wherein said motif-bearing peptides are immunologically cross-reactive with peptides of HCV-1, with a *proviso* that the combination does not include a peptide of at least 8 amino acids from an HCV C domain, the C domain consisting of amino acids 1 to 120 of an HCV polyprotein, and wherein at least one of the peptides bears a motif of Table Ia, said domains selected from the group consisting of:

an S domain, the S domain consisting of amino acids 120-400 of the HCV polyprotein;

an NS3 domain, the NS3 domain consisting of amino acids 1050 to 1640 of the HCV polyprotein;

an NS4 domain, the NS4 domain consisting of amino acids 1640 to 2000 of the HCV polyprotein.;

an NS5 domain, the NS5 domain consisting of amino acids 2000 to 3011 of the HCV polyprotein; and,

an X domain, the X domain consisting of amino acids 750 to 1050 of the HCV polyprotein.

46. The composition of claim 45 further comprising:

HCV motif-bearing envelope peptide(s) consisting of one or more copies of a single HCV peptide comprising at least 8 amino acids of an envelope domain, the envelope domain consisting of amino acids 192 to 750 of the HCV polyprotein.

47. A pharmaceutical composition comprising a pharmaceutically acceptable carrier and combination of two or more motif-bearing peptides from a single domain of an hepatitis C virus strain, said peptides immunologically cross-reactive with peptides of a hepatitis C virus 1 (HCV) antigen,

wherein at least one of the peptides bears a motif of Table Ia., and the peptides are derived from HCV, and the HCV domain is selected from the group consisting of:

a C domain, the C domain consisting of amino acids 1 to 120 of an HCV polyprotein;

an S domain, the S domain consisting of amino acids 120-400 of the HCV polyprotein;

an NS3 domain, the NS3 domain consisting of amino acids 1050 to 1640 of the HCV polyprotein;

an NS4 domain, the NS4 domain consisting of amino acids 1640 to 2000 of the HCV polyprotein;

an NS5 domain, the NS5 domain consisting of amino acids 2000 to 3011 of the HCV polyprotein;

an X domain, the X domain consisting of amino acids 750 to 1050 of the HCV polyprotein; and,

an envelope domain, from a single HCV strain, the envelope domain consisting of amino acids 192 to 750 of the HCV polyprotein, with a *proviso* that the envelope domain is other than a variable envelope domain.